CLAIMS

Claim 1: Apparatus and method to make paper and board by spraying fibrous and other raw materials and chemicals, where the spray direction is essentially downwards onto a moving wire or a nip, formed by a pair of wires, or a wire and a roller, or already formed fiber web and a wire or a roller, using gas propelled or other individually adjustable nozzles that are attached inside a gas flow balanced box, mechanically or dynamically sealed to prevent potentially forming aerosols from escaping, a box that contains one or several controllable rows of these spray nozzles that also can control the humidity conditions inside the box, and from which the excess gases are removed in a regulated way in proximity and generally parallel to the wall that holds the individual spray nozzles.

Claim 2: Apparatus in Claim 1 consisting of one or several generally similar spray box units to independently spray paper manufacturing fibers, fillers, chemicals, fragrances, pre-coatings, and barrier- and other coatings onto paper and board webs, or nips formed by paper webs during their manufacturing processes, or afterwards in a separate process step.

Claim 3: Apparatus in Claim 1 including a non-metering doctoring device, that can include such equipment as a non-metering bent or rigid doctor blade, rigid gap blade, air blade, hot or cold gas blade or condensing steam blade, and controllable gap hydroplaning roller or ordinary roller followed by a non-metering doctoring device, and where the system can include such backing devices like rollers, airless and air aided tables, and wire support with or without vacuum assistance.

Claim 4: Apparatus in Claim 1 where 40 to 80 degrees C spray environment is used for sizing chemicals.

Claim 5: Apparatus in Claim 3 where a roller can be used both as a roller and a hydroplaning roller and where the surface temperature of this roller is controlled by using cooling and heating as required by the process.

Claim 6: Apparatus in Claim 3 where ultrasonic water mist is used for moistening the doctoring devices or the spray box interior area.

Claim 7: Apparatus in Claim 1 where the humidity inside the spray box is controlled by temperature regulated liquid addition into the motive gas line of the nozzles, and where additional adjustments are made using excess gas extraction system that can prevent air from entering the spray box, or from escaping it carrying along potentially harmful aerosols to the environment.

Claim 8: Apparatus in Claim 1 connected to an air cleaning device including a cyclone based air washer from which the wash water can be reused as make-up dilution to the sprayed chemicals or materials, and where the moist air cleaned from spray material and aerosols before release to the atmosphere.

Claim 9: Apparatus in Claim 1 where the material to be sprayed is received from the pressure controlled main distribution line that can include internal fluidizer, into individual nozzle lines through a specific restrictor or orifice, and where the individual nozzle line pressure is measured after the restrictor or orifice, and where a positioning step-motor controls the liquid valve leading to each nozzle.